SEQUENCE LISTING

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<120> Phytase Variants

<130> 5618.520-US

<140> 09/273,871
<141> 1999-03-22

<150> PA 1998 00407
<151> 1998-03-23

<150> PA 1998 00806
<151> 1998-06-19

<150> PA 1998 01176
<151> 1998-09-18

<150> PA 1999 00091
<151> 1999-01-22

<150> 60/080,129
<151> 1998-03-31

<150> 60/090,675
<151> 1998-06-25

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-15 -10 -5

ctg gct gct gct tct ctg tgggttcatc ctttgcccct gtctcgatgt 100
Leu Ala Ala Ala Ser Leu
1

taaaatacta aacatatttc accaga cgt gta ctc tcc cct cag cca gtg tcc 153
Arg Val Leu Ser Pro Gln Pro Val Ser
5 10

tgt gac agc ccg gag ctt ggt tac caa tgc gac cag cag aca acg cac 201
Cys Asp Ser Pro Glu Leu Gly Tyr Gln Cys Asp Gln Gln Thr Thr His
15 20 25

acc tgg ggt caa tac tca ccc ttc ttc tct gtc ccg tca gag atc tcc 249
Thr Trp Gly Gln Tyr Ser Pro Phe Phe Ser Val Pro Ser Glu Ile Ser
30 35 40

cct tcc gtt cct gat ggc tgc cgc ctc acc ttc gcc caa gtt ctc tcc 297
Pro Ser Val Pro Asp Gly Cys Arg Leu Thr Phe Ala Gln Val Leu Ser
45 50 55

cgc cac ggc gcc cgc ttc cca acc ccg ggt aaa gcc gcc gcc atc tcc 345
Arg His Gly Ala Arg Phe Pro Thr Pro Gly Lys Ala Ala Ala Ile Ser
60 65 70 75

gct gtc ctc acc aaa atc aaa acc tct gcc acc tgg tac ggt tcc gac 393
Ala Val Leu Thr Lys Ile Lys Thr Ser Ala Thr Trp Tyr Gly Ser Asp
80 85 90

ttt cag ttc atc aag aac tac gac tat gta ctt ggc gta gac cac ctg 441
Phe Gln Phe Ile Lys Asn Tyr Asp Tyr Val Leu Gly Val Asp His Leu
95 100 105

acc gcg ttc ggc gag caa gaa atg gtc aac tcc ggc atc aag ttc tac 489
Thr Ala Phe Gly Glu Gln Glu Met Val Asn Ser Gly Ile Lys Phe Tyr
110 115 120

cag cgc tac tcc tcc ctc atc cag aca gaa gac tcg gat acg ctc ccc 537
Gln Arg Tyr Ser Ser Leu Ile Gln Thr Glu Asp Ser Asp Thr Leu Pro
125 130 135

ttc gtc cgc gcc tct ggc cag gaa cgc gtc atc gcc tcc gcc gag aac 585
Phe Val Arg Ala Ser Gly Gln Glu Arg Val Ile Ala Ser Ala Glu Asn
140 145 150 155

ttc acc acc ggc ttc tac tcg gcc ctc tca gcc gac aag aac cct cct 633
Phe Thr Thr Gly Phe Tyr Ser Ala Leu Ser Ala Asp Lys Asn Pro Pro
160 165 170

```
tcc tcc tta cca aga cca gaa atg gtc atc att tct gag gag cca aca      681
Ser Ser Leu Pro Arg Pro Glu Met Val Ile Ile Ser Glu Glu Pro Thr
            175                 180                 185

gcc aac aac acc atg cac cac ggc ctc tgc cgc tcc ttt gaa gat tcc      729
Ala Asn Asn Thr Met His His Gly Leu Cys Arg Ser Phe Glu Asp Ser
        190                 195                 200

acc acc ggc gac caa gcc caa gcg gaa ttc atc gcc gcc acc ttc cca      777
Thr Thr Gly Asp Gln Ala Gln Ala Glu Phe Ile Ala Ala Thr Phe Pro
    205                 210                 215

ccc atc acc gcc cgt ctc aac gcc caa ggt ttc aaa ggc gtc acc ctc      825
Pro Ile Thr Ala Arg Leu Asn Ala Gln Gly Phe Lys Gly Val Thr Leu
220                 225                 230                 235

tcc aac acc gac gtc cta tca cta atg gac ctc tgc ccc ttt gac acc      873
Ser Asn Thr Asp Val Leu Ser Leu Met Asp Leu Cys Pro Phe Asp Thr
                240                 245                 250

gtc gcc tac ccc ctt tcc tcc ctc acc acc acc tct tcc gtt tct gga      921
Val Ala Tyr Pro Leu Ser Ser Leu Thr Thr Thr Ser Ser Val Ser Gly
            255                 260                 265

ggc ggc aag tta tcc ccc ttc tgc tct ctt ttc act gcc agc gac tgg      969
Gly Gly Lys Leu Ser Pro Phe Cys Ser Leu Phe Thr Ala Ser Asp Trp
        270                 275                 280

aca atc tac gat tac ctc cag tcc cta ggg aaa tac tac ggt ttc ggc     1017
Thr Ile Tyr Asp Tyr Leu Gln Ser Leu Gly Lys Tyr Tyr Gly Phe Gly
    285                 290                 295

ccc ggt aat tcc cta gct gcc acc cag ggg gta ggg tac gtc aac gag     1065
Pro Gly Asn Ser Leu Ala Ala Thr Gln Gly Val Gly Tyr Val Asn Glu
300                 305                 310                 315

ctt atc gcc cgc ttg atc cgt gct ccc gtc gta gat cac acg acg acc     1113
Leu Ile Ala Arg Leu Ile Arg Ala Pro Val Val Asp His Thr Thr Thr
                320                 325                 330

aac tct act ctt gat ggc gac gaa aaa acg ttt ccg ttg aac aga acg     1161
Asn Ser Thr Leu Asp Gly Asp Glu Lys Thr Phe Pro Leu Asn Arg Thr
            335                 340                 345

gtg tat gcg gat ttt tcc cat gat aat gat atg atg aat atc ctg act     1209
Val Tyr Ala Asp Phe Ser His Asp Asn Asp Met Met Asn Ile Leu Thr
        350                 355                 360

gct ttg cgg ata ttc gag cat atc agt ccg atg gat aac acc act atc     1257
Ala Leu Arg Ile Phe Glu His Ile Ser Pro Met Asp Asn Thr Thr Ile
    365                 370                 375

ccg acc aac tat ggc cag aca gga gat gac ggg gtg aag gaa agg gat     1305
Pro Thr Asn Tyr Gly Gln Thr Gly Asp Asp Gly Val Lys Glu Arg Asp
380                 385                 390                 395

ttg ttc aag gtt agt tgg gcg gtg ccc ttt gct ggg agg gtg tac ttt     1353
```

```
Leu Phe Lys Val Ser Trp Ala Val Pro Phe Ala Gly Arg Val Tyr Phe
                400                 405                 410

gag aaa atg gtt tgt gat gcg gat ggg gat ggc aag att gat agt gat     1401
Glu Lys Met Val Cys Asp Ala Asp Gly Asp Gly Lys Ile Asp Ser Asp
            415                 420                 425

gag gct cag aaa gag ttg gtg agg att ttg gtt aat gat cgg gtg atg     1449
Glu Ala Gln Lys Glu Leu Val Arg Ile Leu Val Asn Asp Arg Val Met
        430                 435                 440

aga ttg aat ggg tgt gat gct gat gaa cag ggt agg tgt gga ttg gag     1497
Arg Leu Asn Gly Cys Asp Ala Asp Glu Gln Gly Arg Cys Gly Leu Glu
    445                 450                 455

aag ttt gtg gag agt atg gag ttt gcg agg aga ggg ggg gag tgg gag     1545
Lys Phe Val Glu Ser Met Glu Phe Ala Arg Arg Gly Gly Glu Trp Glu
460                 465                 470                 475

gag agg tgt ttt gtt tag ctctaga                                    1570
Glu Arg Cys Phe Val  *
                480
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<210> 2
<211> 495
<212> PRT
<213> Cladorrhinum foecundissimum

<220>
<221> SIGNAL
<222> (1)...(15)

<400> 2

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Met Leu Ile Leu Met Ile Pro Leu Phe Ser Tyr Leu Ala Ala Ala Ser
 1               5                  10                  15
Leu Arg Val Leu Ser Pro Gln Pro Val Ser Cys Asp Ser Pro Glu Leu
            20                  25                  30
Gly Tyr Gln Cys Asp Gln Gln Thr Thr His Thr Trp Gly Gln Tyr Ser
        35                  40                  45
Pro Phe Phe Ser Val Pro Ser Glu Ile Ser Pro Ser Val Pro Asp Gly
    50                  55                  60
Cys Arg Leu Thr Phe Ala Gln Val Leu Ser Arg His Gly Ala Arg Phe
65                  70                  75                  80
Pro Thr Pro Gly Lys Ala Ala Ala Ile Ser Ala Val Leu Thr Lys Ile
                85                  90                  95
Lys Thr Ser Ala Thr Trp Tyr Gly Ser Asp Phe Gln Phe Ile Lys Asn
            100                 105                 110
Tyr Asp Tyr Val Leu Gly Val Asp His Leu Thr Ala Phe Gly Glu Gln
        115                 120                 125
Glu Met Val Asn Ser Gly Ile Lys Phe Tyr Gln Arg Tyr Ser Ser Leu
    130                 135                 140
Ile Gln Thr Glu Asp Ser Asp Thr Leu Pro Phe Val Arg Ala Ser Gly
145                 150                 155                 160
Gln Glu Arg Val Ile Ala Ser Ala Glu Asn Phe Thr Thr Gly Phe Tyr
                165                 170                 175
Ser Ala Leu Ser Ala Asp Lys Asn Pro Pro Ser Ser Leu Pro Arg Pro
```

```
            180                 185                 190
Glu Met Val Ile Ile Ser Glu Glu Pro Thr Ala Asn Asn Thr Met His
        195                 200                 205
His Gly Leu Cys Arg Ser Phe Glu Asp Ser Thr Thr Gly Asp Gln Ala
    210                 215                 220
Gln Ala Glu Phe Ile Ala Ala Thr Phe Pro Pro Ile Thr Ala Arg Leu
225                 230                 235                 240
Asn Ala Gln Gly Phe Lys Gly Val Thr Leu Ser Asn Thr Asp Val Leu
                245                 250                 255
Ser Leu Met Asp Leu Cys Pro Phe Asp Thr Val Ala Tyr Pro Leu Ser
            260                 265                 270
Ser Leu Thr Thr Thr Ser Ser Val Ser Gly Gly Gly Lys Leu Ser Pro
        275                 280                 285
Phe Cys Ser Leu Phe Thr Ala Ser Asp Trp Thr Ile Tyr Asp Tyr Leu
    290                 295                 300
Gln Ser Leu Gly Lys Tyr Tyr Gly Phe Gly Pro Gly Asn Ser Leu Ala
305                 310                 315                 320
Ala Thr Gln Gly Val Gly Tyr Val Asn Glu Leu Ile Ala Arg Leu Ile
                325                 330                 335
Arg Ala Pro Val Val Asp His Thr Thr Thr Asn Ser Thr Leu Asp Gly
            340                 345                 350
Asp Glu Lys Thr Phe Pro Leu Asn Arg Thr Val Tyr Ala Asp Phe Ser
        355                 360                 365
His Asp Asn Asp Met Met Asn Ile Leu Thr Ala Leu Arg Ile Phe Glu
    370                 375                 380
His Ile Ser Pro Met Asp Asn Thr Thr Ile Pro Thr Asn Tyr Gly Gln
385                 390                 395                 400
Thr Gly Asp Asp Gly Val Lys Glu Arg Asp Leu Phe Lys Val Ser Trp
                405                 410                 415
Ala Val Pro Phe Ala Gly Arg Val Tyr Phe Glu Lys Met Val Cys Asp
            420                 425                 430
Ala Asp Gly Asp Gly Lys Ile Asp Ser Asp Glu Ala Gln Lys Glu Leu
        435                 440                 445
Val Arg Ile Leu Val Asn Asp Arg Val Met Arg Leu Asn Gly Cys Asp
    450                 455                 460
Ala Asp Glu Gln Gly Arg Cys Gly Leu Glu Lys Phe Val Glu Ser Met
465                 470                 475                 480
Glu Phe Ala Arg Arg Gly Gly Glu Trp Glu Glu Arg Cys Phe Val
                485                 490                 495

<210> 3
<211> 478
<212> PRT
<213> Paxillus involtus

<400> 3
Arg Val Leu Ser Pro Gln Pro Val Ser Cys Asp Ser Pro Glu Leu Gly
 1               5                  10                  15
Tyr Gln Cys Asp Gln Gln Thr Thr His Thr Trp Gly Gln Tyr Ser Pro
            20                  25                  30
Phe Phe Ser Val Pro Ser Glu Ile Ser Pro Ser Val Pro Asp Gly Cys
        35                  40                  45
Arg Leu Thr Phe Ala Gln Val Leu Ser Arg His Gly Ala Arg Phe Pro
    50                  55                  60
Thr Pro Gly Lys Ala Ala Ala Ile Ser Ala Val Leu Thr Lys Ile Lys
65                  70                  75                  80
Thr Ser Ala Thr Trp Tyr Gly Ser Asp Phe Gln Phe Ile Lys Asn Tyr
```

```
                85                  90                  95
Asp Tyr Val Leu Gly Val Asp His Leu Thr Ala Phe Gly Glu Gln Glu
            100                 105                 110
Met Val Asn Ser Gly Ile Lys Phe Tyr Gln Arg Tyr Ser Ser Leu Ile
        115                 120                 125
Gln Thr Glu Asp Ser Asp Thr Leu Pro Phe Val Arg Ala Ser Gly Gln
    130                 135                 140
Glu Arg Val Ile Ala Ser Ala Glu Asn Phe Thr Thr Gly Phe Tyr Ser
145                 150                 155                 160
Ala Leu Ser Ala Asp Lys Asn Pro Pro Ser Ser Leu Pro Arg Pro Glu
                165                 170                 175
Met Val Ile Ile Ser Glu Glu Pro Thr Ala Asn Asn Thr Met His His
            180                 185                 190
Gly Leu Cys Arg Ser Phe Glu Asp Ser Thr Thr Gly Asp Gln Ala Gln
        195                 200                 205
Ala Glu Phe Ile Ala Ala Thr Phe Pro Pro Ile Thr Ala Arg Leu Asn
    210                 215                 220
Ala Gln Gly Phe Lys Gly Val Thr Leu Ser Asn Thr Asp Val Leu Ser
225                 230                 235                 240
Leu Met Asp Leu Cys Pro Phe Asp Thr Val Ala Tyr Pro Leu Ser Ser
                245                 250                 255
Leu Thr Thr Thr Ser Ser Val Ser Gly Gly Gly Lys Leu Ser Pro Phe
            260                 265                 270
Cys Ser Leu Phe Thr Ala Ser Asp Trp Thr Ile Tyr Asp Tyr Leu Gln
        275                 280                 285
Ser Leu Gly Lys Tyr Tyr Gly Phe Gly Pro Gly Asn Ser Leu Ala Ala
    290                 295                 300
Thr Gln Gly Val Gly Tyr Val Asn Glu Leu Ile Ala Arg Leu Ile Arg
305                 310                 315                 320
Ala Pro Val Val Asp His Thr Thr Thr Asn Ser Thr Leu Asp Gly Asp
                325                 330                 335
Glu Lys Thr Phe Pro Leu Asn Arg Thr Val Tyr Ala Asp Phe Ser His
            340                 345                 350
Asp Asn Asp Met Met Asn Ile Leu Thr Ala Leu Arg Ile Phe Glu His
        355                 360                 365
Ile Ser Pro Met Asp Asn Thr Thr Ile Pro Thr Asn Tyr Gly Gln Thr
    370                 375                 380
Gly Asp Asp Gly Val Lys Glu Arg Asp Leu Phe Lys Val Ser Trp Ala
385                 390                 395                 400
Val Pro Phe Ala Gly Arg Val Tyr Phe Glu Lys Met Val Cys Asp Ala
                405                 410                 415
Asp Gly Asp Gly Lys Ile Asp Ser Asp Glu Ala Gln Lys Glu Leu Val
            420                 425                 430
Arg Ile Leu Val Asn Asp Arg Val Met Arg Leu Asn Gly Cys Asp Ala
        435                 440                 445
Asp Glu Gln Gly Arg Cys Gly Leu Glu Lys Phe Val Glu Ser Met Glu
    450                 455                 460
Phe Ala Arg Arg Gly Gly Glu Trp Glu Glu Arg Cys Phe Val
465                 470                 475

<210> 4
<211> 442
<212> PRT
<213> Paxillus involtus

<400> 4
Met His Leu Gly Phe Val Thr Leu Ala Cys Leu Ile His Leu Ser Glu
```

```
 1               5                  10                  15
Val Phe Ala Ala Ser Val Pro Arg Asn Ile Ala Pro Lys Phe Ser Ile
            20                  25                  30
Pro Glu Ser Glu Gln Arg Asn Trp Ser Pro Tyr Ser Pro Tyr Phe Pro
        35                  40                  45
Leu Ala Glu Tyr Lys Ala Pro Pro Ala Gly Cys Glu Ile Asn Gln Val
    50                  55                  60
Asn Ile Ile Gln Arg His Gly Ala Arg Phe Pro Thr Ser Gly Ala Ala
65                  70                  75                  80
Thr Arg Ile Lys Ala Gly Leu Ser Lys Leu Gln Ser Val Gln Asn Phe
                85                  90                  95
Thr Asp Pro Lys Phe Asp Phe Ile Lys Ser Phe Thr Tyr Asp Leu Gly
            100                 105                 110
Thr Ser Asp Leu Val Pro Phe Gly Ala Ala Gln Ser Phe Asp Ala Gly
        115                 120                 125
Leu Glu Val Phe Ala Arg Tyr Ser Lys Leu Val Ser Ser Asp Asn Leu
    130                 135                 140
Pro Phe Ile Arg Ser Asp Gly Ser Asp Arg Val Val Asp Thr Ala Thr
145                 150                 155                 160
Asn Trp Thr Ala Gly Phe Ala Ser Ala Ser Arg Asn Ala Ile Gln Pro
                165                 170                 175
Lys Leu Asp Leu Ile Leu Pro Gln Thr Gly Asn Asp Thr Leu Glu Asp
            180                 185                 190
Asn Met Cys Pro Ala Ala Gly Glu Ser Asp Pro Gln Val Asp Ala Trp
        195                 200                 205
Leu Ala Ser Ala Phe Pro Ser Val Thr Ala Gln Leu Asn Ala Ala Ala
    210                 215                 220
Pro Gly Ala Asn Leu Thr Asp Ala Asp Ala Phe Asn Leu Val Ser Leu
225                 230                 235                 240
Cys Pro Phe Met Thr Val Ser Lys Glu Gln Lys Ser Asp Phe Cys Thr
                245                 250                 255
Leu Phe Glu Gly Ile Pro Gly Ser Phe Glu Ala Phe Ala Tyr Ala Gly
            260                 265                 270
Asp Leu Asp Lys Phe Tyr Gly Thr Gly Tyr Gly Gln Ala Leu Gly Pro
        275                 280                 285
Val Gln Gly Val Gly Tyr Ile Asn Glu Leu Leu Ala Arg Leu Thr Asn
    290                 295                 300
Ser Ala Val Asn Asp Asn Thr Gln Thr Asn Arg Thr Leu Asp Ala Ala
305                 310                 315                 320
Pro Asp Thr Phe Pro Leu Asn Lys Thr Met Tyr Ala Asp Phe Ser His
                325                 330                 335
Asp Asn Leu Met Val Ala Val Phe Ser Ala Met Gly Leu Phe Arg Gln
            340                 345                 350
Ser Ala Pro Leu Ser Thr Ser Thr Pro Asp Pro Asn Arg Thr Trp Leu
        355                 360                 365
Thr Ser Ser Val Val Pro Phe Ser Ala Arg Met Ala Val Glu Arg Leu
    370                 375                 380
Ser Cys Ala Gly Thr Thr Lys Val Arg Val Leu Val Gln Asp Gln Val
385                 390                 395                 400
Gln Pro Leu Glu Phe Cys Gly Gly Asp Gln Asp Gly Leu Cys Ala Leu
                405                 410                 415
Asp Lys Phe Val Glu Ser Gln Ala Tyr Ala Arg Ser Gly Gly Ala Gly
            420                 425                 430
Asp Phe Glu Lys Cys Leu Ala Thr Thr Val
        435                 440
```

<210> 5

<211> 443
<212> PRT
<213> Tremetes pubescens

<400> 5

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Met Ala Phe Ser Ile Leu Ala Ser Leu Leu Phe Val Cys Tyr Ala Tyr
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Ala Arg Ala Val Pro Arg Ala His Ile Pro Leu Arg Asp Thr Ser Ala
            20                  25                  30
Cys Leu Asp Val Thr Arg Asp Val Gln Gln Ser Trp Ser Met Tyr Ser
        35                  40                  45
Pro Tyr Phe Pro Ala Ala Thr Tyr Val Ala Pro Pro Ala Ser Cys Gln
    50                  55                  60
Ile Asn Gln Val His Ile Ile Gln Arg His Gly Ala Arg Phe Pro Thr
65                  70                  75                  80
Ser Gly Ala Ala Lys Arg Ile Gln Thr Ala Val Ala Lys Leu Lys Ala
                85                  90                  95
Ala Ser Asn Tyr Thr Asp Pro Leu Leu Ala Phe Val Thr Asn Tyr Thr
            100                 105                 110
Tyr Ser Leu Gly Gln Asp Ser Leu Val Glu Leu Gly Ala Thr Gln Ser
        115                 120                 125
Ser Glu Ala Gly Gln Glu Ala Phe Thr Arg Tyr Ser Ser Leu Val Ser
    130                 135                 140
Ala Asp Glu Leu Pro Phe Val Arg Ala Ser Gly Ser Asp Arg Val Val
145                 150                 155                 160
Ala Thr Ala Asn Asn Trp Thr Ala Gly Phe Ala Leu Ala Ser Ser Asn
                165                 170                 175
Ser Ile Thr Pro Val Leu Ser Val Ile Ile Ser Glu Ala Gly Asn Asp
            180                 185                 190
Thr Leu Asp Asp Asn Met Cys Pro Ala Ala Gly Asp Ser Asp Pro Gln
        195                 200                 205
Val Asn Gln Trp Leu Ala Gln Phe Ala Pro Pro Met Thr Ala Arg Leu
    210                 215                 220
Asn Ala Gly Ala Pro Gly Ala Asn Leu Thr Asp Thr Asp Thr Tyr Asn
225                 230                 235                 240
Leu Leu Thr Leu Cys Pro Phe Glu Thr Val Ala Thr Glu Arg Arg Ser
                245                 250                 255
Glu Phe Cys Asp Ile Tyr Glu Glu Leu Gln Ala Glu Asp Ala Phe Ala
            260                 265                 270
Tyr Asn Ala Asp Leu Asp Lys Phe Tyr Gly Thr Gly Tyr Gly Gln Pro
        275                 280                 285
Leu Gly Pro Val Gln Gly Val Gly Tyr Ile Asn Glu Leu Ile Ala Arg
    290                 295                 300
Leu Thr Ala Gln Asn Val Ser Asp His Thr Gln Thr Asn Ser Thr Leu
305                 310                 315                 320
Asp Ser Ser Pro Glu Thr Phe Pro Leu Asn Arg Thr Leu Tyr Ala Asp
                325                 330                 335
Phe Ser His Asp Asn Gln Met Val Ala Ile Phe Ser Ala Met Gly Leu
            340                 345                 350
Phe Asn Gln Ser Ala Pro Leu Asp Pro Thr Thr Pro Asp Pro Ala Arg
        355                 360                 365
Thr Phe Leu Val Lys Lys Ile Val Pro Phe Ser Ala Arg Met Val Val
    370                 375                 380
Glu Arg Leu Asp Cys Gly Gly Ala Gln Ser Val Arg Leu Leu Val Asn
385                 390                 395                 400
Asp Ala Val Gln Pro Leu Ala Phe Cys Gly Ala Asp Thr Ser Gly Val
                405                 410                 415
```

```
Cys Thr Leu Asp Ala Phe Val Glu Ser Gln Ala Tyr Ala Arg Asn Asp
            420                 425                 430
Gly Glu Gly Asp Phe Glu Lys Cys Phe Ala Thr
        435                 440
```

<210> 6
<211> 453
<212> PRT
<213> A grocybe pediades

<400> 6

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Met Ser Leu Phe Ile Gly Gly Cys Leu Leu Val Phe Leu Gln Ala Ser
 1               5                  10                  15
Ala Tyr Gly Gly Val Val Gln Ala Thr Phe Val Gln Pro Phe Phe Pro
            20                  25                  30
Pro Gln Ile Gln Asp Ser Trp Ala Ala Tyr Thr Pro Tyr Tyr Pro Val
        35                  40                  45
Gln Ala Tyr Thr Pro Pro Pro Lys Asp Cys Lys Ile Thr Gln Val Asn
    50                  55                  60
Ile Ile Gln Arg His Gly Ala Arg Phe Pro Thr Ser Gly Ala Gly Thr
65                  70                  75                  80
Arg Ile Gln Ala Ala Val Lys Lys Leu Gln Ser Ala Lys Thr Tyr Thr
                85                  90                  95
Asp Pro Arg Leu Asp Phe Leu Thr Asn Tyr Thr Tyr Thr Leu Gly His
            100                 105                 110
Asp Asp Leu Val Pro Phe Gly Ala Leu Gln Ser Ser Gln Ala Gly Glu
        115                 120                 125
Glu Thr Phe Gln Arg Tyr Ser Phe Leu Val Ser Lys Glu Asn Leu Pro
    130                 135                 140
Phe Val Arg Ala Ser Ser Ser Asn Arg Val Val Asp Ser Ala Thr Asn
145                 150                 155                 160
Trp Thr Glu Gly Phe Ser Ala Ala Ser His His Val Leu Asn Pro Ile
                165                 170                 175
Leu Phe Val Ile Leu Ser Glu Ser Leu Asn Asp Thr Leu Asp Asp Ala
            180                 185                 190
Met Cys Pro Asn Ala Gly Ser Ser Asp Pro Gln Thr Gly Ile Trp Thr
        195                 200                 205
Ser Ile Tyr Gly Thr Pro Ile Ala Asn Arg Leu Asn Gln Gln Ala Pro
    210                 215                 220
Gly Ala Asn Ile Thr Ala Ala Asp Val Ser Asn Leu Ile Pro Leu Cys
225                 230                 235                 240
Ala Phe Glu Thr Ile Val Lys Glu Thr Pro Ser Pro Phe Cys Asn Leu
                245                 250                 255
Phe Thr Pro Glu Glu Phe Ala Gln Phe Glu Tyr Phe Gly Asp Leu Asp
            260                 265                 270
Lys Phe Tyr Gly Thr Gly Tyr Gly Gln Pro Leu Gly Pro Val Gln Gly
        275                 280                 285
Val Gly Tyr Ile Asn Glu Leu Leu Ala Arg Leu Thr Glu Met Pro Val
    290                 295                 300
Arg Asp Asn Thr Gln Thr Asn Arg Thr Leu Asp Ser Ser Pro Leu Thr
305                 310                 315                 320
Phe Pro Leu Asp Arg Ser Ile Tyr Ala Asp Leu Ser His Asp Asn Gln
                325                 330                 335
Met Ile Ala Ile Phe Ser Ala Met Gly Leu Phe Asn Gln Ser Ser Pro
            340                 345                 350
Leu Asp Pro Ser Phe Pro Asn Pro Lys Arg Thr Trp Val Thr Ser Arg
        355                 360                 365
```

```
Leu Thr Pro Phe Ser Ala Arg Met Val Thr Glu Arg Leu Leu Cys Gln
    370                 375                 380
Arg Asp Gly Thr Gly Ser Gly Gly Pro Ser Arg Ile Met Arg Asn Gly
385                 390                 395                 400
Asn Val Gln Thr Phe Val Arg Ile Leu Val Asn Asp Ala Leu Gln Pro
                405                 410                 415
Leu Lys Phe Cys Gly Gly Asp Met Asp Ser Leu Cys Thr Leu Glu Ala
            420                 425                 430
Phe Val Glu Ser Gln Lys Tyr Ala Arg Glu Asp Gly Gln Gly Asp Phe
        435                 440                 445
Glu Lys Cys Phe Asp
    450
```

<210> 7
<211> 439
<212> PRT
<213> Peniophora ycii

```
<400> 7
Met Val Ser Ser Ala Phe Ala Pro Ser Ile Leu Leu Ser Leu Met Ser
 1               5                  10                  15
Ser Leu Ala Leu Ser Thr Gln Phe Ser Phe Val Ala Ala Gln Leu Pro
            20                  25                  30
Ile Pro Ala Gln Asn Thr Ser Asn Trp Gly Pro Tyr Asp Pro Phe Phe
        35                  40                  45
Pro Val Glu Pro Tyr Ala Ala Pro Pro Glu Gly Cys Thr Val Thr Gln
    50                  55                  60
Val Asn Leu Ile Gln Arg His Gly Ala Arg Trp Pro Thr Ser Gly Ala
65                  70                  75                  80
Arg Ser Arg Gln Val Ala Ala Val Ala Lys Ile Gln Met Ala Arg Pro
                85                  90                  95
Phe Thr Asp Pro Lys Tyr Glu Phe Leu Asn Asp Phe Val Tyr Lys Phe
            100                 105                 110
Gly Val Ala Asp Leu Leu Pro Phe Gly Ala Asn Gln Ser His Gln Thr
        115                 120                 125
Gly Thr Asp Met Tyr Thr Arg Tyr Ser Thr Leu Phe Glu Gly Gly Asp
    130                 135                 140
Val Pro Phe Val Arg Ala Ala Gly Asp Gln Arg Val Val Asp Ser Ser
145                 150                 155                 160
Thr Asn Trp Thr Ala Gly Phe Gly Asp Ala Ser Gly Glu Thr Val Leu
                165                 170                 175
Pro Thr Leu Gln Val Val Leu Gln Glu Glu Gly Asn Cys Thr Leu Cys
            180                 185                 190
Asn Asn Met Cys Pro Asn Glu Val Asp Gly Asp Glu Ser Thr Thr Trp
        195                 200                 205
Leu Gly Val Phe Ala Pro Asn Ile Thr Ala Arg Leu Asn Ala Ala Ala
    210                 215                 220
Pro Ser Ala Asn Leu Ser Asp Ser Asp Ala Leu Thr Leu Met Asp Met
225                 230                 235                 240
Cys Pro Phe Asp Thr Leu Ser Ser Gly Asn Ala Ser Pro Phe Cys Asp
                245                 250                 255
Leu Phe Thr Ala Glu Glu Tyr Val Ser Tyr Glu Tyr Tyr Tyr Asp Leu
            260                 265                 270
Asp Lys Tyr Tyr Gly Thr Gly Pro Gly Asn Ala Leu Gly Pro Val Gln
        275                 280                 285
Gly Val Gly Tyr Val Asn Glu Leu Leu Ala Arg Leu Thr Gly Gln Ala
    290                 295                 300
```

```
Val Arg Asp Glu Thr Gln Thr Asn Arg Thr Leu Asp Ser Asp Pro Ala
305                 310                 315                 320
Thr Phe Pro Leu Asn Arg Thr Phe Tyr Ala Asp Phe Ser His Asp Asn
                325                 330                 335
Thr Met Val Pro Ile Phe Ala Ala Leu Gly Leu Phe Asn Ala Thr Ala
            340                 345                 350
Leu Asp Pro Leu Lys Pro Asp Glu Asn Arg Leu Trp Val Asp Ser Lys
        355                 360                 365
Leu Val Pro Phe Ser Gly His Met Thr Val Glu Lys Leu Ala Cys Ser
    370                 375                 380
Gly Lys Glu Ala Val Arg Val Leu Val Asn Asp Ala Val Gln Pro Leu
385                 390                 395                 400
Glu Phe Cys Gly Gly Val Asp Gly Val Cys Glu Leu Ser Ala Phe Val
                405                 410                 415
Glu Ser Gln Thr Tyr Ala Arg Glu Asn Gly Gln Gly Asp Phe Ala Lys
            420                 425                 430
Cys Gly Phe Val Pro Ser Glu
        435
```

<210> 8
<211> 465
<212> PRT
<213> Aspergillus fumigatus

<400> 8

```
Met Val Thr Leu Thr Phe Leu Leu Ser Ala Ala Tyr Leu Leu Ser Gly
 1               5                  10                  15
Arg Val Ser Ala Ala Pro Ser Ser Ala Gly Ser Lys Ser Cys Asp Thr
            20                  25                  30
Val Asp Leu Gly Tyr Gln Cys Ser Pro Ala Thr Ser His Leu Trp Gly
        35                  40                  45
Gln Tyr Ser Pro Phe Phe Ser Leu Glu Asp Glu Leu Ser Val Ser Ser
    50                  55                  60
Lys Leu Pro Lys Asp Cys Arg Ile Thr Leu Val Gln Val Leu Ser Arg
65                  70                  75                  80
His Gly Ala Arg Tyr Pro Thr Ser Ser Lys Ser Lys Lys Tyr Lys Lys
                85                  90                  95
Leu Val Thr Ala Ile Gln Ala Asn Ala Thr Asp Phe Lys Gly Lys Phe
            100                 105                 110
Ala Phe Leu Lys Thr Tyr Asn Tyr Thr Leu Gly Ala Asp Asp Leu Thr
        115                 120                 125
Pro Phe Gly Glu Gln Gln Leu Val Asn Ser Gly Ile Lys Phe Tyr Gln
    130                 135                 140
Arg Tyr Lys Ala Leu Ala Arg Ser Val Val Pro Phe Ile Arg Ala Ser
145                 150                 155                 160
Gly Ser Asp Arg Val Ile Ala Ser Gly Glu Lys Phe Ile Glu Gly Phe
                165                 170                 175
Gln Gln Ala Lys Leu Ala Asp Pro Gly Ala Thr Asn Arg Ala Ala Pro
            180                 185                 190
Ala Ile Ser Val Ile Ile Pro Glu Ser Glu Thr Phe Asn Asn Thr Leu
        195                 200                 205
Asp His Gly Val Cys Thr Lys Phe Glu Ala Ser Gln Leu Gly Asp Glu
    210                 215                 220
Val Ala Ala Asn Phe Thr Ala Leu Phe Ala Pro Asp Ile Arg Ala Arg
225                 230                 235                 240
Ala Glu Lys His Leu Pro Gly Val Thr Leu Thr Asp Glu Asp Val Val
                245                 250                 255
```

```
Ser Leu Met Asp Met Cys Ser Phe Asp Thr Val Ala Arg Thr Ser Asp
            260                 265                 270
Ala Ser Gln Leu Ser Pro Phe Cys Gln Leu Phe Thr His Asn Glu Trp
        275                 280                 285
Lys Lys Tyr Asn Tyr Leu Gln Ser Leu Gly Lys Tyr Tyr Gly Tyr Gly
    290                 295                 300
Ala Gly Asn Pro Leu Gly Pro Ala Gln Gly Ile Gly Phe Thr Asn Glu
305                 310                 315                 320
Leu Ile Ala Arg Leu Thr Arg Ser Pro Val Gln Asp His Thr Ser Thr
                325                 330                 335
Asn Ser Thr Leu Val Ser Asn Pro Ala Thr Phe Pro Leu Asn Ala Thr
            340                 345                 350
Met Tyr Val Asp Phe Ser His Asp Asn Ser Met Val Ser Ile Phe Phe
        355                 360                 365
Ala Leu Gly Leu Tyr Asn Gly Thr Glu Pro Leu Ser Arg Thr Ser Val
    370                 375                 380
Glu Ser Ala Lys Glu Leu Asp Gly Tyr Ser Ala Ser Trp Val Val Pro
385                 390                 395                 400
Phe Gly Ala Arg Ala Tyr Phe Glu Thr Met Gln Cys Lys Ser Glu Lys
                405                 410                 415
Glu Pro Leu Val Arg Ala Leu Ile Asn Asp Arg Val Val Pro Leu His
            420                 425                 430
Gly Cys Asp Val Asp Lys Leu Gly Arg Cys Lys Leu Asn Asp Phe Val
        435                 440                 445
Lys Gly Leu Ser Trp Ala Arg Ser Gly Gly Asn Trp Gly Glu Cys Phe
    450                 455                 460
Ser
465

<210> 9
<211> 467
<212> PRT
<213> Artificial Sequence

<220>
<223> Variation

<400> 9
Met Gly Val Phe Val Val Leu Leu Ser Ile Ala Thr Leu Phe Gly Ser
 1               5                  10                  15
Thr Ser Gly Thr Ala Leu Gly Pro Arg Gly Asn Ser His Ser Cys Asp
            20                  25                  30
Thr Val Asp Gly Gly Tyr Gln Cys Phe Pro Glu Ile Ser His Leu Trp
        35                  40                  45
Gly Gln Tyr Ser Pro Tyr Phe Ser Leu Glu Asp Glu Ser Ala Ile Ser
    50                  55                  60
Pro Asp Val Pro Asp Asp Cys Arg Val Thr Phe Val Gln Val Leu Ser
65                  70                  75                  80
Arg His Gly Ala Arg Tyr Pro Thr Ser Ser Lys Ser Lys Ala Tyr Ser
                85                  90                  95
Ala Leu Ile Glu Ala Ile Gln Lys Asn Ala Thr Ala Phe Lys Gly Lys
            100                 105                 110
Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Thr Leu Gly Ala Asp Asp Leu
        115                 120                 125
Thr Pro Phe Gly Glu Asn Gln Met Val Asn Ser Gly Ile Lys Phe Tyr
    130                 135                 140
Arg Arg Tyr Lys Ala Leu Ala Arg Lys Ile Val Pro Phe Ile Arg Ala
```

```
145                 150                 155                 160
Ser Gly Ser Asp Arg Val Ile Ala Ser Ala Glu Lys Phe Ile Glu Gly
                165                 170                 175
Phe Gln Ser Ala Lys Leu Ala Asp Pro Gly Ser Gln Pro His Gln Ala
            180                 185                 190
Ser Pro Val Ile Asp Val Ile Ile Pro Glu Gly Ser Gly Tyr Asn Asn
        195                 200                 205
Thr Leu Asp His Gly Thr Cys Thr Ala Phe Glu Asp Ser Glu Leu Gly
    210                 215                 220
Asp Asp Val Glu Ala Asn Phe Thr Ala Leu Phe Ala Pro Ala Ile Arg
225                 230                 235                 240
Ala Arg Leu Glu Ala Asp Leu Pro Gly Val Thr Leu Thr Asp Glu Asp
                245                 250                 255
Val Val Tyr Leu Met Asp Met Cys Pro Phe Glu Thr Val Ala Arg Thr
            260                 265                 270
Ser Asp Ala Thr Glu Leu Ser Pro Phe Cys Ala Leu Phe Thr His Asp
        275                 280                 285
Glu Trp Arg Gln Tyr Asp Tyr Leu Gln Ser Leu Gly Lys Tyr Tyr Gly
    290                 295                 300
Tyr Gly Ala Gly Asn Pro Leu Gly Pro Ala Gln Gly Val Gly Phe Ala
305                 310                 315                 320
Asn Glu Leu Ile Ala Arg Leu Thr Arg Ser Pro Val Gln Asp His Thr
                325                 330                 335
Ser Thr Asn His Thr Leu Asp Ser Asn Pro Ala Thr Phe Pro Leu Asn
            340                 345                 350
Ala Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Ser Met Ile Ser Ile
        355                 360                 365
Phe Phe Ala Leu Gly Leu Tyr Asn Gly Thr Ala Pro Leu Ser Thr Thr
    370                 375                 380
Ser Val Glu Ser Ile Glu Glu Thr Asp Gly Tyr Ser Ala Ser Trp Thr
385                 390                 395                 400
Val Pro Phe Gly Ala Arg Ala Tyr Val Glu Met Met Gln Cys Gln Ala
                405                 410                 415
Glu Lys Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
            420                 425                 430
Leu His Gly Cys Ala Val Asp Lys Leu Gly Arg Cys Lys Arg Asp Asp
        435                 440                 445
Phe Val Glu Gly Leu Ser Phe Ala Arg Ser Gly Gly Asn Trp Ala Glu
    450                 455                 460
Cys Phe Ala
465
```

<210> 10
<211> 463
<212> PRT
<213> Aspergillus nidulans

<400> 10

```
Met Ala Phe Phe Thr Val Ala Leu Ser Leu Tyr Tyr Leu Leu Ser Arg
 1               5                  10                  15
Val Ser Ala Gln Ala Pro Val Val Gln Asn His Ser Cys Asn Thr Ala
            20                  25                  30
Asp Gly Gly Tyr Gln Cys Phe Pro Asn Val Ser His Val Trp Gly Gln
        35                  40                  45
Tyr Ser Pro Tyr Phe Ser Ile Glu Gln Glu Ser Ala Ile Ser Glu Asp
    50                  55                  60
Val Pro His Gly Cys Glu Val Thr Phe Val Gln Val Leu Ser Arg His
```

```
65                  70                  75                  80
Gly Ala Arg Tyr Pro Thr Glu Ser Lys Ser Lys Ala Tyr Ser Gly Leu
                85                  90                  95
Ile Glu Ala Ile Gln Lys Asn Ala Thr Ser Phe Trp Gly Gln Tyr Ala
            100                 105                 110
Phe Leu Glu Ser Tyr Asn Tyr Thr Leu Gly Ala Asp Asp Leu Thr Ile
        115                 120                 125
Phe Gly Glu Asn Gln Met Val Asp Ser Gly Ala Lys Phe Tyr Arg Arg
    130                 135                 140
Tyr Lys Asn Leu Ala Arg Lys Asn Thr Pro Phe Ile Arg Ala Ser Gly
145                 150                 155                 160
Ser Asp Arg Val Val Ala Ser Ala Glu Lys Phe Ile Asn Gly Phe Arg
                165                 170                 175
Lys Ala Gln Leu His Asp His Gly Ser Lys Arg Ala Thr Pro Val Val
            180                 185                 190
Asn Val Ile Ile Pro Glu Ile Asp Gly Phe Asn Asn Thr Leu Asp His
        195                 200                 205
Ser Thr Cys Val Ser Phe Glu Asn Asp Glu Arg Ala Asp Glu Ile Glu
    210                 215                 220
Ala Asn Phe Thr Ala Ile Met Gly Pro Pro Ile Arg Lys Arg Leu Glu
225                 230                 235                 240
Asn Asp Leu Pro Gly Ile Lys Leu Thr Asn Glu Asn Val Ile Tyr Leu
                245                 250                 255
Met Asp Met Cys Ser Phe Asp Thr Met Ala Arg Thr Ala His Gly Thr
            260                 265                 270
Glu Leu Ser Pro Phe Cys Ala Ile Phe Thr Glu Lys Glu Trp Leu Gln
        275                 280                 285
Tyr Asp Tyr Leu Gln Ser Leu Ser Lys Tyr Tyr Gly Tyr Gly Ala Gly
    290                 295                 300
Ser Pro Leu Gly Pro Ala Gln Gly Ile Gly Phe Thr Asn Glu Leu Ile
305                 310                 315                 320
Ala Arg Leu Thr Gln Ser Pro Val Gln Asp Asn Thr Ser Thr Asn His
                325                 330                 335
Thr Leu Asp Ser Asn Pro Ala Thr Phe Pro Leu Asp Arg Lys Leu Tyr
            340                 345                 350
Ala Asp Phe Ser His Asp Asn Ser Met Ile Ser Ile Phe Phe Ala Met
        355                 360                 365
Gly Leu Tyr Asn Gly Thr Gln Pro Leu Ser Met Asp Ser Val Glu Ser
    370                 375                 380
Ile Gln Glu Met Asp Gly Tyr Ala Ala Ser Trp Thr Val Pro Phe Gly
385                 390                 395                 400
Ala Arg Ala Tyr Phe Glu Leu Met Gln Cys Glu Lys Lys Glu Pro Leu
                405                 410                 415
Val Arg Val Leu Val Asn Asp Arg Val Val Pro Leu His Gly Cys Ala
            420                 425                 430
Val Asp Lys Phe Gly Arg Cys Thr Leu Asp Asp Trp Val Glu Gly Leu
        435                 440                 445
Asn Phe Ala Arg Ser Gly Gly Asn Trp Lys Thr Cys Phe Thr Leu
    450                 455                 460
```

<210> 11
<211> 467
<212> PRT
<213> Aspergillus ficuum

<400> 11
Met Gly Val Ser Ala Val Leu Leu Pro Leu Tyr Leu Leu Ser Gly Val

```
 1               5                  10                  15
Thr Ser Gly Leu Ala Val Pro Ala Ser Arg Asn Gln Ser Ser Cys Asp
            20                  25                  30
Thr Val Asp Gln Gly Tyr Gln Cys Phe Ser Glu Thr Ser His Leu Trp
        35                  40                  45
Gly Gln Tyr Ala Pro Phe Phe Ser Leu Ala Asn Glu Ser Val Ile Ser
    50                  55                  60
Pro Glu Val Pro Ala Gly Cys Arg Val Thr Phe Ala Gln Val Leu Ser
65                  70                  75                  80
Arg His Gly Ala Arg Tyr Pro Thr Asp Ser Lys Gly Lys Lys Tyr Ser
                85                  90                  95
Ala Leu Ile Glu Glu Ile Gln Gln Asn Ala Thr Thr Phe Asp Gly Lys
            100                 105                 110
Tyr Ala Phe Leu Lys Thr Tyr Asn Tyr Ser Leu Gly Ala Asp Asp Leu
        115                 120                 125
Thr Pro Phe Gly Glu Gln Glu Leu Val Asn Ser Gly Ile Lys Phe Tyr
    130                 135                 140
Gln Arg Tyr Glu Ser Leu Thr Arg Asn Ile Val Pro Phe Ile Arg Ser
145                 150                 155                 160
Ser Gly Ser Ser Arg Val Ile Ala Ser Gly Lys Lys Phe Ile Glu Gly
                165                 170                 175
Phe Gln Ser Thr Lys Leu Lys Asp Pro Arg Ala Gln Pro Gly Gln Ser
            180                 185                 190
Ser Pro Lys Ile Asp Val Val Ile Ser Glu Ala Ser Ser Ser Asn Asn
        195                 200                 205
Thr Leu Asp Pro Gly Thr Cys Thr Val Phe Glu Asp Ser Glu Leu Ala
    210                 215                 220
Asp Thr Val Glu Ala Asn Phe Thr Ala Thr Phe Val Pro Ser Ile Arg
225                 230                 235                 240
Gln Arg Leu Glu Asn Asp Leu Ser Gly Val Thr Leu Thr Asp Thr Glu
                245                 250                 255
Val Thr Tyr Leu Met Asp Met Cys Ser Phe Asp Thr Ile Ser Thr Ser
            260                 265                 270
Thr Val Asp Thr Lys Leu Ser Pro Phe Cys Asp Leu Phe Thr His Asp
        275                 280                 285
Glu Trp Ile Asn Tyr Asp Tyr Leu Gln Ser Leu Lys Lys Tyr Tyr Gly
    290                 295                 300
His Gly Ala Gly Asn Pro Leu Gly Pro Thr Gln Gly Val Gly Tyr Ala
305                 310                 315                 320
Asn Glu Leu Ile Ala Arg Leu Thr His Ser Pro Val His Asp Asp Thr
                325                 330                 335
Ser Ser Asn His Thr Leu Asp Ser Ser Pro Ala Thr Phe Pro Leu Lys
            340                 345                 350
Ser Thr Leu Tyr Ala Asp Phe Ser His Asp Asn Gly Ile Ile Ser Ile
        355                 360                 365
Leu Phe Ala Leu Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Thr
    370                 375                 380
Thr Val Glu Asn Ile Thr Gln Thr Asp Gly Phe Ser Ser Ala Trp Thr
385                 390                 395                 400
Val Pro Phe Ala Ser Arg Leu Tyr Val Glu Met Met Gln Cys Gln Ala
                405                 410                 415
Glu Gln Ala Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Val Pro
            420                 425                 430
Leu His Gly Cys Pro Val Asp Ala Leu Gly Arg Cys Thr Arg Asp Ser
        435                 440                 445
Phe Val Arg Gly Leu Ser Phe Ala Arg Ser Gly Gly Asp Trp Ala Glu
    450                 455                 460
```

Cys Phe Ala
465

<210> 12
<211> 466
<212> PRT
<213> Aspergillus terreus

<400> 12
Met Gly Phe Leu Ala Ile Val Leu Ser Val Ala Leu Leu Phe Arg Ser
 1   5   10   15
Thr Ser Gly Thr Pro Leu Gly Pro Arg Gly Lys His Ser Asp Cys Asn
            20   25   30
Ser Val Asp His Gly Tyr Gln Cys Phe Pro Glu Leu Ser His Lys Trp
        35   40   45
Gly Leu Tyr Ala Pro Tyr Phe Ser Leu Gln Asp Glu Ser Pro Phe Pro
    50   55   60
Leu Asp Val Pro Glu Asp Cys His Ile Thr Phe Val Gln Val Leu Ala
65   70   75   80
Arg His Gly Ala Arg Ser Pro Thr His Ser Lys Thr Lys Ala Tyr Ala
                85   90   95
Ala Thr Ile Ala Ala Ile Gln Lys Ser Ala Thr Ala Phe Pro Gly Lys
            100   105   110
Tyr Ala Phe Leu Gln Ser Tyr Asn Tyr Ser Leu Asp Ser Glu Glu Leu
        115   120   125
Thr Pro Phe Gly Arg Asn Gln Leu Arg Asp Leu Gly Ala Gln Phe Tyr
    130   135   140
Glu Arg Tyr Asn Ala Leu Thr Arg His Ile Asn Pro Phe Val Arg Ala
145   150   155   160
Thr Asp Ala Ser Arg Val His Glu Ser Ala Glu Lys Phe Val Glu Gly
                165   170   175
Phe Gln Thr Ala Arg Gln Asp Asp His His Ala Asn Pro His Gln Pro
            180   185   190
Ser Pro Arg Val Asp Val Ala Ile Pro Glu Gly Ser Ala Tyr Asn Asn
        195   200   205
Thr Leu Glu His Ser Leu Cys Thr Ala Phe Glu Ser Ser Thr Val Gly
    210   215   220
Asp Asp Ala Val Ala Asn Phe Thr Ala Val Phe Ala Pro Ala Ile Ala
225   230   235   240
Gln Arg Leu Glu Ala Asp Leu Pro Gly Val Gln Leu Ser Thr Asp Asp
                245   250   255
Val Val Asn Leu Met Ala Met Cys Pro Phe Glu Thr Val Ser Leu Thr
            260   265   270
Asp Asp Ala His Thr Leu Ser Pro Phe Cys Asp Leu Phe Thr Ala Thr
        275   280   285
Glu Trp Thr Gln Tyr Asn Tyr Leu Leu Ser Leu Asp Lys Tyr Tyr Gly
    290   295   300
Tyr Gly Gly Gly Asn Pro Leu Gly Pro Val Gln Gly Val Gly Trp Ala
305   310   315   320
Asn Glu Leu Met Ala Arg Leu Thr Arg Ala Pro Val His Asp His Thr
                325   330   335
Cys Val Asn Asn Thr Leu Asp Ala Ser Pro Ala Thr Phe Pro Leu Asn
            340   345   350
Ala Thr Leu Tyr Ala Asp Phe Ser His Asp Ser Asn Leu Val Ser Ile
        355   360   365
Phe Trp Ala Leu Gly Leu Tyr Asn Gly Thr Ala Pro Leu Ser Gln Thr
    370   375   380

```
Ser Val Glu Ser Val Ser Gln Thr Asp Gly Tyr Ala Ala Ala Trp Thr
385                 390                 395                 400
Val Pro Phe Ala Ala Arg Ala Tyr Val Glu Met Met Gln Cys Arg Ala
                405                 410                 415
Glu Lys Glu Pro Leu Val Arg Val Leu Val Asn Asp Arg Val Met Pro
            420                 425                 430
Leu His Gly Cys Pro Thr Asp Lys Leu Gly Arg Cys Lys Arg Asp Ala
        435                 440                 445
Phe Val Ala Gly Leu Ser Phe Ala Gln Ala Gly Gly Asn Trp Ala Asp
    450                 455                 460
Cys Phe
465
```

<210> 13
<211> 466
<212> PRT
<213> Talaromyces thermophilus

<400> 13

```
Met Ser Leu Leu Leu Leu Val Leu Ser Gly Gly Leu Val Ala Leu Tyr
 1               5                  10                  15
Val Ser Arg Asn Pro His Val Asp Ser His Ser Cys Asn Thr Val Glu
            20                  25                  30
Gly Gly Tyr Gln Cys Arg Pro Glu Ile Ser His Ser Trp Gly Gln Tyr
        35                  40                  45
Ser Pro Phe Phe Ser Leu Ala Asp Gln Ser Glu Ile Ser Pro Asp Val
    50                  55                  60
Pro Gln Asn Cys Lys Ile Thr Phe Val Gln Leu Leu Ser Arg His Gly
65                  70                  75                  80
Ala Arg Tyr Pro Thr Ser Ser Lys Thr Glu Leu Tyr Ser Gln Leu Ile
                85                  90                  95
Ser Arg Ile Gln Lys Thr Ala Thr Ala Tyr Lys Gly Tyr Tyr Ala Phe
            100                 105                 110
Leu Lys Asp Tyr Arg Tyr Gln Leu Gly Ala Asn Asp Leu Thr Pro Phe
        115                 120                 125
Gly Glu Asn Gln Met Ile Gln Leu Gly Ile Lys Phe Tyr Asn His Tyr
    130                 135                 140
Lys Ser Leu Ala Arg Asn Ala Val Pro Phe Val Arg Cys Ser Gly Ser
145                 150                 155                 160
Asp Arg Val Ile Ala Ser Gly Arg Leu Phe Ile Glu Gly Phe Gln Ser
                165                 170                 175
Ala Lys Val Leu Asp Pro His Ser Asp Lys His Asp Ala Pro Pro Thr
            180                 185                 190
Ile Asn Val Ile Ile Glu Glu Gly Pro Ser Tyr Asn Asn Thr Leu Asp
        195                 200                 205
Thr Gly Ser Cys Pro Val Phe Glu Asp Ser Ser Gly Gly His Asp Ala
    210                 215                 220
Gln Glu Lys Phe Ala Lys Gln Phe Ala Pro Ala Ile Leu Glu Lys Ile
225                 230                 235                 240
Lys Asp His Leu Pro Gly Val Asp Leu Ala Val Ser Asp Val Pro Tyr
                245                 250                 255
Leu Met Asp Leu Cys Pro Phe Glu Thr Leu Ala Arg Asn His Thr Asp
            260                 265                 270
Thr Leu Ser Pro Phe Cys Ala Leu Ser Thr Gln Glu Glu Trp Gln Ala
        275                 280                 285
Tyr Asp Tyr Tyr Gln Ser Leu Gly Lys Tyr Tyr Gly Asn Gly Gly Gly
    290                 295                 300
```

```
Asn Pro Leu Gly Pro Ala Gln Gly Val Gly Phe Val Asn Glu Leu Ile
305                 310                 315                 320
Ala Arg Met Thr His Ser Pro Val Gln Asp Tyr Thr Thr Val Asn His
                325                 330                 335
Thr Leu Asp Ser Asn Pro Ala Thr Phe Pro Leu Asn Ala Thr Leu Tyr
            340                 345                 350
Ala Asp Phe Ser His Asp Asn Thr Met Thr Ser Ile Phe Ala Ala Leu
        355                 360                 365
Gly Leu Tyr Asn Gly Thr Ala Lys Leu Ser Thr Thr Glu Ile Lys Ser
    370                 375                 380
Ile Glu Glu Thr Asp Gly Tyr Ser Ala Ala Trp Thr Val Pro Phe Gly
385                 390                 395                 400
Gly Arg Ala Tyr Ile Glu Met Met Gln Cys Asp Asp Ser Asp Glu Pro
                405                 410                 415
Val Val Arg Val Leu Val Asn Asp Arg Val Val Pro Leu His Gly Cys
            420                 425                 430
Glu Val Asp Ser Leu Gly Arg Cys Lys Arg Asp Asp Phe Val Arg Gly
        435                 440                 445
Leu Ser Phe Ala Arg Gln Gly Gly Asn Trp Glu Gly Cys Tyr Ala Ala
    450                 455                 460
Ser Glu
465
```

<210> 14
<211> 475
<212> PRT
<213> Thermomyces lanuginosa

<400> 14

```
Met Ala Gly Ile Gly Leu Gly Ser Phe Leu Val Leu Leu Leu Gln Phe
 1               5                  10                  15
Ser Ala Leu Leu Thr Ala Ser Pro Ala Ile Pro Pro Phe Trp Arg Lys
            20                  25                  30
Lys His Pro Asn Val Asp Ile Ala Arg His Trp Gly Gln Tyr Ser Pro
        35                  40                  45
Phe Phe Ser Leu Ala Glu Val Ser Glu Ile Ser Pro Ala Val Pro Lys
    50                  55                  60
Gly Cys Arg Val Glu Phe Val Gln Val Leu Ser Arg His Gly Ala Arg
65                  70                  75                  80
Tyr Pro Thr Ala His Lys Ser Glu Val Tyr Ala Glu Leu Leu Gln Arg
                85                  90                  95
Ile Gln Asp Thr Ala Thr Glu Phe Lys Gly Asp Phe Ala Phe Leu Arg
            100                 105                 110
Asp Tyr Ala Tyr His Leu Gly Ala Asp Asn Leu Thr Arg Phe Gly Glu
        115                 120                 125
Glu Gln Met Met Glu Ser Gly Arg Gln Phe Tyr His Arg Tyr Arg Glu
    130                 135                 140
Gln Ala Arg Glu Ile Val Pro Phe Val Arg Ala Ala Gly Ser Ala Arg
145                 150                 155                 160
Val Ile Ala Ser Ala Glu Phe Phe Asn Arg Gly Phe Gln Asp Ala Lys
                165                 170                 175
Asp Arg Asp Pro Arg Ser Asn Lys Asp Gln Ala Glu Pro Val Ile Asn
            180                 185                 190
Val Ile Ile Ser Glu Glu Thr Gly Ser Asn Asn Thr Leu Asp Gly Leu
        195                 200                 205
Thr Cys Pro Ala Ala Glu Glu Ala Pro Asp Pro Thr Gln Pro Ala Glu
    210                 215                 220
```

```
Phe Leu Gln Val Phe Gly Pro Arg Val Leu Lys Lys Ile Thr Lys His
225                 230                 235                 240
Met Pro Gly Val Asn Leu Thr Leu Glu Asp Val Pro Leu Phe Met Asp
                245                 250                 255
Leu Cys Pro Phe Asp Thr Val Gly Ser Asp Pro Val Leu Phe Pro Arg
            260                 265                 270
Gln Leu Ser Pro Phe Cys His Leu Phe Thr Ala Asp Asp Trp Met Ala
        275                 280                 285
Tyr Asp Tyr Tyr Tyr Thr Leu Asp Lys Tyr Tyr Ser His Gly Gly Gly
    290                 295                 300
Ser Ala Phe Gly Pro Ser Arg Gly Val Gly Phe Val Asn Glu Leu Ile
305                 310                 315                 320
Ala Arg Met Thr Gly Asn Leu Pro Val Lys Asp His Thr Thr Val Asn
                325                 330                 335
His Thr Leu Asp Asp Asn Pro Glu Thr Phe Pro Leu Asp Ala Val Leu
            340                 345                 350
Tyr Ala Asp Phe Ser His Asp Asn Thr Met Thr Gly Ile Phe Ser Ala
        355                 360                 365
Met Gly Leu Tyr Asn Gly Thr Lys Pro Leu Ser Thr Ser Lys Ile Gln
    370                 375                 380
Pro Pro Thr Gly Ala Ala Ala Asp Gly Tyr Ala Ala Ser Trp Thr Val
385                 390                 395                 400
Pro Phe Ala Ala Arg Ala Tyr Val Glu Leu Leu Arg Cys Glu Thr Glu
                405                 410                 415
Thr Ser Ser Glu Glu Glu Glu Glu Gly Glu Asp Glu Pro Phe Val Arg
            420                 425                 430
Val Leu Val Asn Asp Arg Val Val Pro Leu His Gly Cys Arg Val Asp
        435                 440                 445
Arg Trp Gly Arg Cys Arg Arg Asp Glu Trp Ile Lys Gly Leu Thr Phe
    450                 455                 460
Ala Arg Gln Gly Gly His Trp Asp Arg Cys Phe
465                 470                 475

<210> 15
<211> 487
<212> PRT
<213> Myceliophthora thermophila

<400> 15
Met Thr Gly Leu Gly Val Met Val Val Met Val Gly Phe Leu Ala Ile
 1               5                  10                  15
Ala Ser Leu Gln Ser Glu Ser Arg Pro Cys Asp Thr Pro Asp Leu Gly
            20                  25                  30
Phe Gln Cys Gly Thr Ala Ile Ser His Phe Trp Gly Gln Tyr Ser Pro
        35                  40                  45
Tyr Phe Ser Val Pro Ser Glu Leu Asp Ala Ser Ile Pro Asp Asp Cys
    50                  55                  60
Glu Val Thr Phe Ala Gln Val Leu Ser Arg His Gly Ala Arg Ala Pro
65                  70                  75                  80
Thr Leu Lys Arg Ala Ala Ser Tyr Val Asp Leu Ile Asp Arg Ile His
                85                  90                  95
His Gly Ala Ile Ser Tyr Gly Pro Gly Tyr Glu Phe Leu Arg Thr Tyr
            100                 105                 110
Asp Tyr Thr Leu Gly Ala Asp Glu Leu Thr Arg Thr Gly Gln Gln Gln
        115                 120                 125
Met Val Asn Ser Gly Ile Lys Phe Tyr Arg Arg Tyr Arg Ala Leu Ala
    130                 135                 140
```

```
Arg Lys Ser Ile Pro Phe Val Arg Thr Ala Gly Gln Asp Arg Val Val
145                 150                 155                 160
His Ser Ala Glu Asn Phe Thr Gln Gly Phe His Ser Ala Leu Leu Ala
                165                 170                 175
Asp Arg Gly Ser Thr Val Arg Pro Thr Leu Pro Tyr Asp Met Val Val
            180                 185                 190
Ile Pro Glu Thr Ala Gly Ala Asn Asn Thr Leu His Asn Asp Leu Cys
        195                 200                 205
Thr Ala Phe Glu Glu Gly Pro Tyr Ser Thr Ile Gly Asp Asp Ala Gln
    210                 215                 220
Asp Thr Tyr Leu Ser Thr Phe Ala Gly Pro Ile Thr Ala Arg Val Asn
225                 230                 235                 240
Ala Asn Leu Pro Gly Ala Asn Leu Thr Asp Ala Asp Thr Val Ala Leu
                245                 250                 255
Met Asp Leu Cys Pro Phe Glu Thr Val Ala Ser Ser Ser Ser Asp Pro
            260                 265                 270
Ala Thr Ala Asp Ala Gly Gly Gly Asn Gly Arg Pro Leu Ser Pro Phe
        275                 280                 285
Cys Arg Leu Phe Ser Glu Ser Glu Trp Arg Ala Tyr Asp Tyr Leu Gln
    290                 295                 300
Ser Val Gly Lys Trp Tyr Gly Tyr Gly Pro Gly Asn Pro Leu Gly Pro
305                 310                 315                 320
Thr Gln Gly Val Gly Phe Val Asn Glu Leu Leu Ala Arg Leu Ala Gly
                325                 330                 335
Val Pro Val Arg Asp Gly Thr Ser Thr Asn Arg Thr Leu Asp Gly Asp
            340                 345                 350
Pro Arg Thr Phe Pro Leu Gly Arg Pro Leu Tyr Ala Asp Phe Ser His
        355                 360                 365
Asp Asn Asp Met Met Gly Val Leu Gly Ala Leu Gly Ala Tyr Asp Gly
    370                 375                 380
Val Pro Pro Leu Asp Lys Thr Ala Arg Arg Asp Pro Glu Glu Leu Gly
385                 390                 395                 400
Gly Tyr Ala Ala Ser Trp Ala Val Pro Phe Ala Ala Arg Ile Tyr Val
                405                 410                 415
Glu Lys Met Arg Cys Ser Gly Gly Gly Gly Gly Gly Gly Gly Gly Glu
            420                 425                 430
Gly Arg Gln Glu Lys Asp Glu Glu Met Val Arg Val Leu Val Asn Asp
        435                 440                 445
Arg Val Met Thr Leu Lys Gly Cys Gly Ala Asp Glu Arg Gly Met Cys
    450                 455                 460
Thr Leu Glu Arg Phe Ile Glu Ser Met Ala Phe Ala Arg Gly Asn Gly
465                 470                 475                 480
Lys Trp Asp Leu Cys Phe Ala
                485
```

1